Death to Einstein!
A Debate Between KH and Scott Reeves On the Validity of Special Relavity, With an Ultimate Disproof Offered at the End

A discussion in the comments section on Scott Reeves's YouTube video

"Death to Einstein!: Exposing Special Relativity's Fatal Flaws - Video 1"

KH wrote:

Wrong! In your "two possible ways to combine them", The first way is wrong because the speed of light is independent of the speed of the source. The observer at rest does NOT observe the expanding sphere to be moving to the right.

The second way is wrong also: You ask "Why does the inside observer count his first tick as occuring when the light strickes the center...other than when he sees the light srike the upper left corner of his ship?" Simple! Because, that's NOT what he observes. He sees the light hit the plate first and expands outward from there. The very lack of simultanaeity that this experiment demonstrates explains this.

Here are the facts: Observer 1 sees things the first way, and Observer 2 sees things the second way. Both ways are correct in their respective frames of reference.

It is amazing to me that you would think that scientists for years wouldn't have considered such a simple thought experiment and explained it. The answer is, they have. And special relativity holds!

Scott Reeves wrote:

Thanks for taking the time to watch the videos, and for your challenges. I appreciate both. Sorry it's taken me so long to respond.

"In your "two possible ways to combine them", The first way is wrong because the speed of light is independent of the speed of the source. The observer at rest does NOT observe the expanding sphere to be moving to the right."

Correct. Which I've said in subsequent videos I've done on this subject, if not in this particular video. However, in this video, I did still discount this combination. I claim that all possible combinations violate Relativity, for a variety of reasons, not that one particular combination doesn't violate it.

"The second way is wrong also: You ask "Why does the inside observer count his first tick as occuring when the light strickes the center...other than when he sees the light srike the upper left corner of his ship?" Simple! Because, that's NOT what he observes. He sees

the light hit the plate first and expands outward from there. The very lack of simultanaeity that this experiment demonstrates explains this"

That is why what I said is wrong according to Special Relativity. I agree.

“Here are the facts: Observer 1 sees things the first way, and Observer 2 sees things the second way. Both ways are correct in their respective frames of reference.”

I won’t respond to this one, since I see you’ve subsequently commented on my Video 1 Addendum (https://youtu.be/AhNMDbl6r3A), in which I addressed this objection.

“It is amazing to me that you would think that scientists for years wouldn't have considered such a simple thought experiment and explained it. The answer is, they have. And special relativity holds!”

That’s because you apparently have more faith than I do in the intelligence, lack of bias, and critical thinking skills of modern scientists.

Anyway, I’ve never seen the relativity of simultaneity and the time dilation thought experiments considered in one thought experiment before. Not saying that it hasn’t been, just that I’ve never run across it, and I’ve read a LOT of books on Relativity. I’ve always seen them treated separately.

KH wrote:

Just noticed this reply, and I'm glad to see it. Sorry I didn't notice it earlier.

“I’ve never seen the relativity of simultaneity and the time dilation thought experiments considered in one thought experiment before. Not saying that it hasn’t been, just that I’ve never run across it, and I’ve read a LOT of books on Relativity. I’ve always seen them treated separately.”

Wow, I can't believe you missed them, because I've seen several. Yours, actually, is one of the better ones I've seen (although we obviously disagree about the interpretation). I look forward to continuing a dialog with you about this. First I'm going to read your response to my comment on your other video, and then reply to your counter-arguments.

Meanwhile, here is an excellent treatment of special relativity, including all the math behind it (which isn't difficult--high school algebra; no calculus). It's a free lecture series by Brian Greene. Lots of thought experiments, etc.
http://www.worldscienceu.com/courses/university/special-relativity

One more thing--you said "That’s because you apparently have more faith than I do in the intelligence, lack of bias, and critical thinking skills of modern scientists."

I couldn't agree more--I have great faith in the scientific community's abilities in this regard. Science is the only discipline that constantly checks itself, recognizes its own mistakes, corrects earlier thinking, objectively challenges nonsensical criticisms, etc. I am not a scientist, but I do have a BA in math with a minor in physics, and I love science. That doesn't mean all scientists are unbiased and ethical--there are certainly many who aren't. But, like I say, the bad ones are quickly weeded out. Einstein, of all of them, has successfully withstood even the most ardent of challenges, and for a very long time.

Scott Reeves wrote:

"Wow, I can't believe you missed them, because I've seen several."

Since our last exchange, I actually did run across several as well, most notably one by Einstein himself, in his "Electrodynamics of Moving Bodies." He claims to show mathematically why I am wrong, but I also stumbled across two others that explain why Einstein himself is wrong. I haven't actually had a chance to dig into them yet, so I can't really comment on them, other than that on first glance they seem to be saying pretty much the same thing I'm saying, better than I'm saying it, and one of them, at least, before I was saying it.

If you're interested, here they are:

https://www.researchgate.net/publication/228708764_The_Failure_of_the_Einstein-Lorentz_Spherical_Wave_Proof

http://www.naturalphilosophy.org/site/harryricker/2015/06/04/the-light-sphere-paradox-of-einsteins-special-relativity/

The second one also claims that he could find very few references to this topic, appearing to corroborate my claim that this topic is rarely addressed. I know, two ignorant people corroborating each other doesn't mean much.

Are the several you're referring to the same ones I listed above? If not, could you give a specific link or name a book you're referring to, because I really am interested in gathering as much information on this topic as I can find.

"Meanwhile, here is an excellent treatment of special relativity, including all the math behind it (which isn't difficult--high school algebra; no calculus)."

Thanks for the link. I will sign up for it eventually. I've read several of Brian Greene's books, and the course looks interesting.

"I love science"

I love science too. That's why I reject Relativity.

“Einstein, of all of them, has successfully withstood even the most ardent of challenges, and for a very long time.”

That is a commonly held, widespread belief. But Einstein’s assertion that all reference frames are equivalent for the physical description of natural processes, with no preferred frame, is not as yet supported by any empirical evidence. It’s not that he’s withstood challenges; it’s that the fundamental assertion of his theory hasn’t yet been tested.

Comments on Death to Einstein!: Exposing Special Relativity's Fatal Flaws - Addendum to Video 1

KH wrote:

At 1:12, it is meaningless to talk about a photon being on top of a wave. What do you mean by "wave"?

At 1:34, of course BOTH! Simultaneity is RELATIVE. That means the sequence of 2 events that one observer sees can be observed to happen in reverse from another observer's standpoint. So when the inside observer says, "see the light hit this photosensitive cell first, then the one to the aft of that, etc.", the outside observer will say, "No, the clocks on your photosensitive cells weren't synchronized. In my reference frame, the sequence was reversed, and the cells were activated from aft to fore." Both observers are correct; there's no absolute truth in this case.

Here's a consequence of Special Relativity that you've ignored: Consider two events separated by a distance d. If the time between those two events is less than the time required for light to travel the distance, d, then the two events may be observed in some reference frame to be simultaneous, and to even occur in the reverse sequence in another reference frame. In this case, the two reference frames are moving fast enough with respect to each other to invoke this reverse effect. The inside observer sees the events occurring from fore to aft (as the rays hits the ceiling), while the outside observer sees the opposite.

Scott Reeves wrote:

Again, thanks for watching my videos and challenging me. I welcome and appreciate challenges to what I’m saying in my videos, and I really do want someone to point out things that I hadn’t considered or addressed.

“it is meaningless to talk about a photon being on top of a wave.”

I only meant “top” in terms of the illustration on the screen. Call it a photon, or a point on a light wave, at 90 degrees to the point of emission, or however else you want to refer to it. One unit along the y-axis from the point of emission, the point of emission being the origin. Whatever.

“What do you mean by ‘wave’?”

I mean it either in the sense of particle/wave duality, or in the sense of soldiers in a battle, such as the first wave of soldiers hits the enemy, then the second wave, etc.

In the most basic sense, I mean a collection of photons that can be considered as such a wave due to their having been emitted from the same central point simultaneously, a simultaneity about which there can be no disagreement by any observer in any reference frame. Thus, analyzing any one particular photon so emitted from a central point implicitly reveals information about other photons emitted in different directions from the same point at the same time as the photon in question.

I call this the “no photon is an island” law, which I elaborate upon in my “no photon is an island” videos, one of which is here: https://youtu.be/3ufVWH5iofA

“At 1:34, of course BOTH! Simultaneity is RELATIVE. That means the sequence of 2 events that one observer sees can be observed to happen in reverse from another observer's standpoint. So when the inside observer says, "see the light hit this photosensitive cell first, then the one to the aft of that, etc.", the outside observer will say, "No, the clocks on your photosensitive cells weren't synchronized. In my reference frame, the sequence was reversed, and the cells were activated from aft to fore." Both observers are correct; there's no absolute truth in this case.”

Your explanation is of course exactly in keeping with what Special Relativity would claim, for the exact reason you’re mentioning. But it’s not BOTH simply because Relativity claims that it is. I’m showing why it can’t possibly be both, NOT ignoring the fact that according to Special Relativity it is both.

And I didn’t mean to imply that the striking of the photosensitive cells in my example would necessarily be monitored solely by clocks. In other videos, I’ve talked about ways to measure the direction in which the light creeps across the hull (which I call the “directional creep” flaw of Relativity) that don’t involve clocks, by just putting an irregularity in the surface of the cube ship in my video (spherical ship in later videos), which will cast a shadow or won’t cast a shadow depending upon which observer is actually, absolutely in motion.

I’ve also talked about using a rotating hull covered with numbers. I’ve also mentioned this same thought experiment using a single photon from an angled emitter and a focused source such as a laser beam, which also doesn’t involve dependence upon the travel time of light or disagreements about simultaneity due to clock synchronization problems. There are a lot of ways to get around having to use clocks to determine in what order specific areas of the hull were struck by the photons.

A few relevant videos of mine:
https://youtu.be/C1h0TpWYCyo

https://youtu.be/it8gTk5WRFY

“Here's a consequence of Special Relativity that you've ignored:”

I haven’t ignored it. It’s just a restatement of your previous objection, and my videos address it quite a lot.

KH wrote:

To my first objection about a photon on a wave...OK, I understand your meaning now. That's fine.

>>There are a lot of ways to get around having to use clocks to determine in what order specific areas of the hull were struck by the photons.

It looks like you still don't get the whole idea of the relativity of simultaneity. Let me try it this way: This isn't a question of trying to synchronize clocks, etc., so by eliminating them, you can get around the issue--you can't. Let's call the sphere of light hitting the sensor at the top of the ship "event A", and lets call the event of that same sphere hitting the upper left corner of the ship "event B". The fact is, in the spaceship's frame of reference, event A happens first. In the stationary observer's frame of reference, event B happens first. Similarly, the very SHAPE of the expanding circle of light that the sphere creates id different--in the spaceship's frame it's centered on the sensor, and in stationary observer's frame it's centered on the upper rear corner. BOTH are correct. Both observers can prove what they saw. And both observers would find fault with the other's measurements because they wouldn't agree about the time sequence that things happened. Same with the angle of the light beam (vertical or at 45 degrees). Both are correct. It simply depends on what frame you're in. We talk about synchronized clocks because that makes it a little easier to explain; but we don't need clocks. Things are happening in the opposite sequence in the two different frames--all because of the relativity of simultaneity. I hate the word "observer" in most discussions, because it might make people think it's a problem with the observation methods. That's not it. We're talking about facts being different depending on one's frame of reference.

Let me try it this way. I tell you point A is further east than point B. You disagree, saying no, point B is further east. Then we look--you're using true north; I was using magnetic north. Your view and my view are different because our respective frames of reference are rotated with respect to each other. Now the analogy breaks down, because we agree there's only one true north; but my point is, there is more than one way to look at two points on a plane and deciding which one is further to the right...or higher up... etc.

Now, with time as the fourth dimension, consider the same possibility of the time dimension being rotated along with one of the spatial dimensions (namely the direction of the ship's travel, in this case). The different frames now change the sequence of events, as well as the distance between them and the time difference between them. It's only by considering all three together that you can make the whole thing consistent. If you ignore

any one of these three effects (time dilation, Lorentz-Fitzgerald contraction, and the change in simultaneity), you will run into contradictions and paradoxes of the sort you've discovered. But once you factor in all three, things become consistent again, and Special Relativity holds.

I look forward to your reply.

Scott Reeves wrote:

“This isn't a question of trying to synchronize clocks, etc., so by eliminating them, you can get around the issue--you can't.”

I agree that it’s not a clock synchronization issue. I mentioned methods for getting rid of clocks entirely because I knew people would argue against my idea by citing a clock synchronization issue, as you yourself did an your earlier response, when you said: “So when the inside observer says, ‘see the light hit this photosensitive cell first, then the one to the aft of that, etc.’, the outside observer will say, ‘No, the clocks on your photosensitive cells weren't synchronized. In my reference frame, the sequence was reversed, and the cells were activated from aft to fore.’”

“Let's call the sphere of light hitting the sensor at the top of the ship "event A", and lets call the event of that same sphere hitting the upper left corner of the ship "event B". The fact is, in the spaceship's frame of reference, event A happens first. In the stationary observer's frame of reference, event B happens first.”

I completely agree with you on that. That is exactly what Relativity claims regarding the timing. But I reject that both observers are correct. Because what I’m talking about is not a question of whether event A or event B happened first. It’s a disagreement about whether a particular photon X on the expanding sphere of light strikes point A or point B, regardless of the timing of such a strike, both points being equidistant from the point of emission of the wave. The same photon can’t strike both points. It can only be coincidental with one of the points, unless it does some weird sort of physics-defying maneuver once it strikes the first point. It’s physically impossible. In Relativity, both observers think they’re talking about the same photon, and they have to be in order for Relativity to be valid. But it’s physically impossible.

“Similarly, the very SHAPE of the expanding circle of light that the sphere creates id different--in the spaceship's frame it's centered on the sensor, and in stationary observer's frame it's centered on the upper rear corner. BOTH are correct.”

I’m not sure what you’re saying here. Unless I’m misunderstanding you, in neither observer’s frame is the sphere centered on the sensor or the upper rear corner.

“Both observers can prove what they saw.”

What either observer saw is irrelevant. “What they saw” involves a mathematical treatment of the round-trip journey of the light during one tick-tock of the light clock. My thought experiments only deal with a single tick of the clock, the one-way journey of the light. I only include the two observers to identify the current reference frame. What each observer actually sees or calculates about the round-trip journey of the light is irrelevant. How the light actually behaves relative to him and another observer on a single leg of its journey isn’t.

“And both observers would find fault with the other's measurements because they wouldn't agree about the time sequence that things happened. Same with the angle of the light beam (vertical or at 45 degrees).”

They disagree over the angle of the light beam NOT because they don’t agree about the time sequence that things happened, but because they disagree over the location of the central point of the expanding light sphere. And they disagree on THAT because they’re attempting to adhere to Relativity, which claims that there are no preferred reference frames, and that the round-trip speed of light is constant for all observers, and uses a clock-synchronization convention that makes the one-way speed equivalent to the round-trip speed, even though that one-way speed has never actually been measured. Which is the same reason they disagree on the time sequence that things happened.

The disagreement in the angle of a directed light beam offers the physical proof that the idea presented in some of my videos is correct. In the proof, it’s not the angle of the beam itself that is important, but the angle of the physical device (or the angle at which it is aimed) which emits the beam.

If the light clock is initially set ticking by a single photon which then subsequently bounces between the mirrors, keeping time for one observer, then if that initial photon is emitted from a focused, directed source, such as a laser gun that is attached to the inside hull of the ship on one mirror of the light clock, then in order for the photon to hit the upper mirror, the gun must be aimed exactly perpendicular to the upper mirror (directly at it) for the ship observer, and at an angle (so that the emitted photon can strike the moving mirror) for the outside observer, the angle dependent upon the velocity of the ship as measured by the outside observer, who considers himself to be stationary and the ship moving. In other words, the laser gun has to be angled differently in each reference frame in order to hit the same target.

And it is obviously a physical impossibility for the laser gun to be angled differently depending upon the reference frame. That would require the ship to have a different configuration depending upon your state of motion relative to it. And I don’t mean “different” in the sense of length contraction. Length contraction does not resolve this, nor is this a relativity of simultaneity issue. Relativity requires the physical construction of the ship itself to be different for different observers at the area of the laser gun emitter. If you can show me where and how I’m wrong about this, I welcome the correction.

“Things are happening in the opposite sequence in the two different frames--all because of the relativity of simultaneity. I hate the word "observer" in most discussions, because it might make people think it's a problem with the observation methods. That's not it. We're talking about facts being different depending on one's frame of reference.”

I understand that’s the way Relativity views things. But I’m showing that facts CAN’T be different depending upon one’s frame of reference. It may be workable mathematically, but it’s a mathematical description that cannot be translated into physical reality, as attempting to do so leads to physical impossibilities, such as the angled emitter problem that I talk about in several of my videos.

“If you ignore any one of these three effects (time dilation, Lorentz-Fitzgerald contraction, and the change in simultaneity), you will run into contradictions and paradoxes of the sort you've discovered.”

I’m not running into contradictions and paradoxes because I’m ignoring those three effects. I’m running into contradictions and paradoxes because Einstein’s theory has not successfully gotten away from the existence of an absolute, preferred reference frame, which those three effects were designed (but failed) to do away with. All three of those effects are irrelevant to the angled emitter problem I’ve outlined. In other words, they cannot explain away the physical impossibility of Relativity that it demonstrates.

That’s my contention, at least. The angled emitter problem I’ve outlined doesn’t depend upon the simultaneity (or lack of it) of two events; it doesn’t depend upon the distance between the emitter and the point struck by an emitted photon or beam; and any time dilation the photon may experience on its way to a distant point has no effect on which particular point the photon strikes. It depends solely upon whether or not it’s physically possible for the laser gun to be angled differently relative to the spaceship, depending upon which observer you ask. Which it isn’t.

Think of this: say there’s a guy (or a girl) with a rifle riding on the back of a galloping horse, and there’s a moving target on a track some distance from him, keeping exact pace with the horse. There’s another guy in some bleachers past which the horse is running. All the guy on horseback has to do to hit the target is fire directly at it, without angling his rifle, and the guy watching from the bleachers agrees that the rifle doesn’t need to be angled, because classical mechanics and addition of velocities are in play. And if the guy in the bleachers wants to hit the target with his own rifle, he has to lead it, firing at an angle so the bullet hits the moving target, and horseback guy agrees that bleacher guy’s rifle must be angled.

Not so in Relativity, when the bullets are photons and the relative motion between horse and observer is great enough. Then things work differently. There are no addition of velocities for light, so when the guy on horseback fires his rifle, from the viewpoint of the guy in the bleachers, unless the guy on horseback angles his rifle, the bullet (photon) will miss the target, as the bullet does not retain the horse’s velocity. It speeds away from where the rifle was when the bullet was fired, not where the rifle currently is, keeping

pace with it. So the guy in the bleachers says the guy on horseback needs to angle his rifle in order to hit the target, opposite from what he says if addition of velocities is in play and it's ordinary bullets in the rifle. Meanwhile, the guy on horseback says that no, he doesn't need to angle his rifle to hit the target, because it is the guy in the bleachers who is moving past him, and bleacher guy's velocity has no impact on the velocity of his bullet. Yet the guy on horseback can't both angle his rifle and not angle it, depending on which observer you consult. There is an objective fact of the matter as to whether he's angling his rifle or not. His hands, arms and shoulders either are or are not positioned to hold the rifle at an angle. They can't be both at the same time. Yet in order to be valid, Relativity REQUIRES that horseback guy's rifle is angled or not angled, depending on which observer you ask. Relativity demands the physically impossible to be possible, therefore it can't possibly be a valid theory.

But ultimately, even ignoring all Relativity's various flaws that I point out in my videos, at the end of the day it is at best premature to claim Relativity is a valid theory, because it still has not been determined whether the geocentric reference frame is an absolute, preferred frame, as I contend it is, or merely one among a multitude of equivalent frames, as Relativity claims. And since Earth is observably at the center of the observable universe, a fact which requires Relativity to invoke the Cosmological and Copernican Principles to get around, both principles of which require the existence of a larger universe beyond our observable universe, a larger universe whose existence cannot be empirically demonstrated due to its being unobservable, Relativity is actually pseudo-science, and can thus safely be ignored. The simplest explanation for all available empirical evidence is that Earth is unmoving at the center of the entire universe. Einstein's Relativity is ultimately an unnecessary, untenable complication requiring assumptions that cannot be empirically tested.

KH wrote:

OK, regarding the SINGLE photon that travels from the light source straight up to the sensor (in the spaceship's frame). That same photon travels the path you've you've drawn in your animation, hitting the sensor--not the corner. Both observers agree where the photon hit. In fact, both observers will agree on exactly where each and every photon hits the ship's interior (sensor, wall, corner or whatever point you pick.) They only disagree about the SEQUENCE of those strikes. Let's talk about two photons now. The one that goes straight up and hits the sensor (call it P1) and the one the goes to the upper left corner of the ship (call it P2). Both P2 and P1 leave the source at the same time and both observers agree on that, since there's no spatial separation at that point in time. But they disagree about when the photons strike their target. The stationary observer finds that P2 hits the corner before P1 hits the sensor, and the observer on the ship finds the reverse to be true--all explained by the relativity of simultaneity.

Now let's address the DIRECTION of P1, which I think is your main objection--right?

Here's an analogy. Suppose you have a gun that shoots steel balls at 40mph (very slow, for a gun). If you aim that gun straight up out the sun roof of a car traveling at 30mph, the ball will leave the gun at 50 mph at about a 36-degree angle from vertical.

It's the same with P1 (the photon hitting the sensor). Let's pretend for a moment that P1 is the only photon being fired. Both observers agree that P1 is directed straight up from its source. And both observers agree that the photon remains directly above its source during its trip to the ceiling. But the stationary observer sees the source moving at considerable speed to the right. So the photon HAS to move at an angle from vertical in order to stay directly above its source.

So the laser gun does NOT have to be aimed differently for the beam to travel at the angle we're talking about. It's still aiming straight up, but the beam doesn't go straight up in the stationary frame. A gun in motion that fires a bullet perpendicular to that motion does not not fire its bullets in the direction it's aiming (when viewed from the ground) and the same is true of lasers. This is true regardless of special relativity.

Scott Reeves wrote:

“OK, regarding the SINGLE photon that travels from the light source straight up to the sensor (in the spaceship's frame). That same photon travels the path you've you've drawn in your animation, hitting the sensor--not the corner. Both observers agree where the photon hit.”

They agree that A photon hits the sensor. But they don’t agree that it’s the SAME photon. The location of the point of emission is critical to this. The observer in the spaceship, who sees himself and the gun as stationary and the outside observer in motion, believes that the point of emission lies at the gun, while the outside observer, who sees himself as stationary and the gun in motion, believes that the point of emission does not lie at the gun, but rather nearer to him. Due to this disagreement regarding the location of the point of emission, and keeping the sphere of light in mind, the outside observer says, “The photon which strikes the sensor in the ship is located at a forty-five degree to the point of emission.” While the spaceship observer says, “No, the photon which strikes the sensor is located at a 90 degree angle.”

If we give each photon on the sphere (circle, in 2d animations) a name, say the name of the photon at 90 degrees is Lucy and the photon at 45 degrees is Phil, the outside observer will say Phil strikes the sensor, while the spaceship observer will say Lucy strikes the sensor. It’s easy to speak of photons as if they’re interchangeable and one is as good as another when they’re seemingly anonymous, but if the photon hitting the sensor is a party and I’m a straight single male expecting Lucy to show up and Phil does instead, I’ll be ticked off. And the person who shows up at the party doesn’t depend on which of the other people at the party you ask. There’s a definite fact of the matter as to whether Lucy or Phil shows up. Relativity says that it can be Lucy OR Phil depending upon who you ask.

“In fact, both observers will agree on exactly where each and every photon hits the ship's interior (sensor, wall, corner or whatever point you pick.) They only disagree about the SEQUENCE of those strikes.”

They don’t agree on exactly where each and every photon hits. At the very least, the spaceship observer claims Lucy hits the sensor, while the outside observer disagrees and claims Phil hits the sensor.

They also CAN’T disagree about the sequence. In one of my videos, I described a method of enabling a shadow to be cast on the wall or not depending upon which portions of the inner hull were hit by the photons first. If the wall was being hit first on one side of the imperfection I described, then a shadow would be cast, and if the wall was hit first on the opposite side of the imperfection, a shadow would not be cast. Of course such an experiment has never actually been carried out, and I haven’t given a great deal of thought or calculation to the exact details of the “shadow caster,” so I realize this isn’t evidence of what I’m saying. But then neither does anything we’re talking about, whether for or against, as it isn’t actually technologically possible for us to do this yet.

“Both P2 and P1 leave the source at the same time and both observers agree on that, since there's no spatial separation at that point in time.”

Yes. And all observers agree that ALL the photons, spread out in a circular wave for 360 degrees around the point of emission, leave that point at the same time, not just P1 and P2. But the observers disagree on the location of that point of emission, as BOTH observers MUST claim that the point is stationary relative to them, if we’re to adhere to the idea that light is independent of the motion of its source AND that the speed of light is constant for all observers. Thus, and this is crucial, the speed of light for all photons in the sphere of light is always relative to their common point of emission, and if that point moves relative to whichever observer’s viewpoint we’ve chosen, then the photons will be moving faster than light relative to that observer, which violates Relativity.

The outside observer believes the source (the device) that produced the sphere is receding from both himself and the point of emission, while the spaceship observer believes the source and the point of emission remain coincidental. One of the observers is most definitely incorrect in his belief, because if they’re both correct, Relativity leads to physical impossibilities, such as the Lucy/Phil photon duality, and is invalid. And if they’re not both correct, Relativity is invalid because there’s absolutely no doubt as to which observer is actually in motion.

“Here's an analogy. Suppose you have a gun that shoots steel balls at 40mph (very slow, for a gun). If you aim that gun straight up out the sun roof of a car traveling at 30mph, the ball will leave the gun at 50 mph at about a 36-degree angle from vertical….It's the same with P1 (the photon hitting the sensor).”

It’s NOT the same with photons as it is with steel balls. Addition of velocities applies with steel balls (which is what you’re describing), but not with photons.

“So the laser gun does NOT have to be aimed differently for the beam to travel at the angle we're talking about. It's still aiming straight up, but the beam doesn't go straight up in the stationary frame.”

It must, and this is exactly why I used the spherical light wave rather than individual photons in most of my animations, for the reason I’ll show below.

“A gun in motion that fires a bullet perpendicular to that motion does not not fire its bullets in the direction it's aiming (when viewed from the ground)”

This is true – with an ordinary gun, obeying classical Newtonian mechanics. Meaning addition of velocities apply. (I’m assuming one of those two nots is a typo rather than a double negative).

“and the same is true of lasers. This is true regardless of special relativity.”

Do you also believe that a photon emitted by a star receding from Earth will take longer to reach us than a similar photon emitted by a stationary star at the same distance?

It can’t be true regardless of special relativity, not if the constancy of light speed holds for all observers regardless of state of motion.

When the bullets are photons, classical Newtonian mechanics, i.e. addition of velocities, is prohibited.

If the photon, from the viewpoint of the stationary frame, were to travel diagonally from a laser gun aimed straight upward, staying centered over the source, the stationary observer would witness a violation of the constancy of light speed.

How so? For one thing, the photon shouldn’t stay centered over the source (the laser gun itself), but rather over the point of emission. In the stationary reference frame, the point of emission does not remain coincidental with the laser gun. The gun, attached to the moving spaceship, races away from the point of emission.

At this point it’s easiest to switch over to the expanding sphere of light to explain this. As I said in my videos and in earlier comments, the sphere (circle, in 2d) consists of a ring of photons all moving away from a common center. If the sphere is emitted from a light bulb, the sphere expands in all directions. And all the photons comprising the sphere must at all times remain equidistant from the point of emission as the sphere expands, since light moves at a constant speed.

If the light bulb is attached to a spaceship moving to the right from the viewpoint of an external observer, does the central point of emission remain centered on the moving light bulb? No, it can’t, or it will violate Relativity. Due to the constancy of c, ALL the photons MUST remain equidistant from that central point, as the stationary observer

MUST measure the same speed of light for all the photons. If the central point is moving along with the light bulb from the viewpoint of the stationary observer, and all the photons maintain the same distance from it, then all the photons will be moving faster than light from the viewpoint of the stationary observer, because relative to the stationary observer, the central point's speed is bulb speed + c.

You can try to say that length contraction resolves this problem, that the forward-directed photons are moving through a contracted space and so aren't moving as far as other photons in the same amount of time, but this resolves nothing, because that means the photons aren't staying equidistant from the point of emission, meaning they're not traveling at the same speed…

You can then try adding in time dilation, saying the forward-directed photons are time dilated and so somehow take longer to traverse the contracted space. But then you're saying that time dilation makes things move more slowly. So you're in effect saying that as things accelerate, they move more slowly…

Then you can try adding in relativity of simultaneity, saying the photons don't all reach the same distances from the central point of emission at the same time…which means the photons aren't all traveling the same speed.

With all that in mind, back to the laser gun. If both observers agree that the photon stays directly above the upward-aimed moving gun as you suggest, this means that the point of emission is moving along with the gun, leading to the problems with the spherical wave that I outlined above.

So if, from the viewpoint of a stationary observer, a photon fired from an upward-aimed moving laser gun hits the target, then Relativity is an invalid theory. Thus, in order for Relativity to remain a valid theory, the gun must be angled from the viewpoint of the stationary observer, and not angled from the viewpoint of the observer moving along with the gun. And that is physically impossible, meaning that Relativity is invalid.

Here is the proof that you're treating light differently based on the state of motion of the source: let's say we have TWO identical laser guns (maybe I should start calling them photon guns), in motion relative to each other. Both are aimed straight upward. Each gun has a target attached to it some distance away. Target A is attached to gun A, and target B is attached to gun B. The guns are offset on the z-axis just enough that they can safely move past each other without colliding. And the trigger of each gun is extended so that when the other gun passes, the triggers touch and both guns fire, at the exact moment of their alignment, a moment over which their can be no disagreement about simultaneity among observers, as it's a single event at a single location.

An observer stationary relative to gun A sees gun B go whizzing past. Their triggers touch, and the guns both fire a photon. Based on your earlier assertion that a photon from an upwardly aimed moving gun moves at an angle so that it stays above the gun, the photon from stationary gun A will shoot upward to strike target A, while the photon from

upwardly aimed moving gun B will shoot at an angle to strike target B. WHY would the photon go angling off from one gun but not the other? What physical explanation is there for this? If you toss a ball up in a moving car, the reason it stays above your hand is because you and the ball share the motion of the car to begin with (inertia, addition of velocities, etc) and your motion is affected by the car's motion; you're not independent. The only explanation in the case of the laser gun is that light is affected by the state of motion of its source and not moving independently, a claim disallowed by Relativity. If the photon shares the motion of the source, then addition of velocities would come into play, making photons move faster than light for some observers. The ONLY difference between the guns and the photons in this situation is motion. So the same observer has to attribute differing behavior to the photons based upon the state of motion of the source. If he did not treat them differently, and adhered to the idea that light is independent of the motion of its source, an idea that is foundational to Relativity, then the photon from moving gun B would shoot up to target A, following the same path as the photon from gun A. To hit target B, from the viewpoint of the stationary observer, gun B would need to be angled, else its photon would hit target A just like the stationary gun.

So to get around this flaw, which invalidates Relativity, light must be treated differently based upon the motion of the source, as you are doing, a treatment which itself violates Relativity, thereby invalidating it. Or else it can be acknowledged that the same gun is angled differently depending upon the observer, which is physically impossible, again invalidating Relativity.

Back to the naming photons thing I mentioned earlier: in this case, you're claiming that the stationary gun fires a Lucy photon, while the moving gun fires a Phil photon. Unless you're claiming that the point of emission moves along with the moving gun, in which case both guns do fire a Lucy photon, and both observers agree that a Lucy photon strikes the sensor. But this means the stationary observer would measure the photons as moving faster than light (gun speed + c).

Based upon this and numerous other flaws I talk about in other videos, Relativity is not a valid theory.

KH wrote:

"If we give each photon on the sphere (circle, in 2d animations) a name, say the name of the photon at 90 degrees is Lucy and the photon at 45 degrees is Phil, the outside observer will say Phil strikes the sensor, while the spaceship observer will say Lucy strikes the sensor. It's easy to speak of photons as if they're interchangeable and one is as good as another when they're seemingly anonymous, but if the photon hitting the sensor is a party and I'm a straight single male expecting Lucy to show up and Phil does instead, I'll be ticked off. And the person who shows up at the party doesn't depend on which of the other people at the party you ask. There's a definite fact of the matter as to whether Lucy or Phil shows up. Relativity says that it can be Lucy OR Phil depending upon who you ask."

Wrong! Relativity does NOT say this. Wherever you read this is in error.

"But this means the stationary observer would measure the photons as moving faster than light (gun speed + c)."

Nope. You're forgetting about time dilation. As I said before, Special Relativity is only consistent if you always remember to take all three factors into account. The stationary observer sees the photon moving at the light speed and TAKING LONGER to reach its target. That's time dilation.

"This is true – with an ordinary gun, obeying classical Newtonian mechanics. Meaning addition of velocities apply. (I'm assuming one of those two nots is a typo rather than a double negative)."

The double not was a typo; thank you. Look, you're taking the analogy with bullets too far. I only meant to use it to explain the DIRECTION of the photon, not its speed. The movement of the source perpendicular to the direction of the photon changes its direction, from the stationary observer's frame, but NOT its speed. I know that sounds paradoxical, but that's the whole point. If you take into account time dilation and lack of simultaneity, it removes the paradox.

"If you toss a ball up in a moving car, the reason it stays above your hand is because you and the ball share the motion of the car to begin with (inertia, addition of velocities, etc) and your motion is affected by the car's motion; you're not independent. The only explanation in the case of the laser gun is that light is affected by the state of motion of its source and not moving independently, a claim disallowed by Relativity"

Aha, I think this is the crux of your misunderstanding. Relativity does NOT say that a moving source has no affect on the motion of the light from the stationary observer's standpoint. Not only can the direction of the light be affected but so can the wavelength. That's how we know stars are moving away from us. There's a doppler red-shift caused by the star's motion. The ONLY thing that is not affected by the motion of the light source is its SPEED, which is constant. And the only way to make sense out of that is by applying time dilation, length contraction and lack of simultaneity.

I won't go any further analyzing your counter-arguments because they're based on the above assertions, which simply aren't claims of Special Relativity. Photons can and do move in a different direction that where they're aimed, if the source is in motion. That can definitely be proved experimentally. But their speed is NOT affected.

Scott Reeves wrote:

"I won't go any further analyzing your counter-arguments because they're based on the above assertions, which simply aren't claims of Special Relativity."

Okay, I will abandon the above assertions. Instead, I will show that Relativity is invalid based solely upon what I believe are the two points upon which you and I agree. Correct me if I'm wrong, but unless I'm misreading your comments, I believe we agree on the following two points:

1) BOTH OBSERVERS AGREE THAT IT IS THE SAME IDENTICAL PHOTON WHICH STRIKES THE SENSOR. I believe you agree with Statement 1 due to your earlier statement in response to this statement of mine: "They agree that a photon hits the sensor. But they don't agree that it's the SAME photon." You responded: "YES, they DO agree, and that's my point. That's what I meant when I said let's focus on a SINGLE photon. Both observers agree that THAT SAME PHOTON leaves the source and strikes the sensor. The just don't agree about the direction of the photon (more below)" That sounds to me like you definitely agree with Statement 1.

2) THE STATIONARY OBSERVER SEES THE PHOTON (THE SAME ONE IN STATEMENT 1) MOVING AT AN ANGLE, WHILE THE SPACESHIP OBSERVER SEES IT MOVING STRAIGHT UPWARD. I believe you agree with this due to your earlier statement, "It's the same with P1 (the photon hitting the sensor). Let's pretend for a moment that P1 is the only photon being fired. Both observers agree that P1 is directed straight up from its source. And both observers agree that the photon remains directly above its source during its trip to the ceiling. But the stationary observer sees the source moving at considerable speed to the right. So the photon HAS to move at an angle from vertical in order to stay directly above its source." That sounds to me like you definitely agree with Statement 2.

I don't see how two intelligent people such as us can possibly disagree on those two statements. And I'm not trying to trick you with them, honestly. They seem perfectly reasonable to me, and don't appear to me to contradict anything either of us have said. And agreement with both of them destroys Relativity, as follows.

One quick clarification: I believe that you're conflating the source with the point of emission. To me, the source and the point of emission are not identical. The source is the device/object from which the photon or the light sphere was emitted. The point of emission is the point in space at which the photon or the light sphere was emitted by the source. In Relativity, the source and the point of emission may or may not coincide, depending upon the observer.

Here is how the statements destroy Relativity:

Statement 2 shows that each observer regards the point of emission of the photon as remaining stationary relative to himself. Simply tracing the path of the photon in each frame back to its beginning reveals where each frame regards the point of emission as being located. The spaceship observer regards the point of emission as coincidental with the source, while the stationary observer regards the source as racing away from the point of emission.

IF BOTH VIEWPOINTS IN STATEMENT 2 ARE TO BE TAKEN AS EQUALLY CORRECT (as Relativity does take them) rather than one viewpoint as correct and the other as mere appearance (as I take them, in rejection of Relativity), then unless you claim that a photon moving at a 45-degree angle relative to the point of emission and a photon moving at a 90-degree angle relative to the point of emission can somehow be the same identical photon, THEN Statement 2 is incompatible with Statement 1. I CAN ACCEPT BOTH STATEMENT 1 AND STATEMENT 2 AS TRUE; SOMEONE WHO BELIEVES RELATIVITY TO BE VALID CANNOT. It is physically impossible for Statement 1 to be false; Statement 2 is clearly true whether you accept Relativity or not. Therefore, Relativity is invalid.

You CAN choose to deny that Statement 2 shows that the point of emission remains stationary relative to each observer, and instead say that the point of emission can be moving along with the source relative to the stationary observer, thereby allowing both observers to agree that the same 90-degree photon hits the sensor, as the 90-degree photon will then seem to be moving at an angle from the viewpoint of the stationary observer, agreeing with his observation. But by doing so, you destroy the relativity of simultaneity. Even taking into account length contraction and time dilation, the round-trip journey for both the forward-directed photon and the aft-directed photon is identical, as length contraction affects both paths equally, and time dilation affects both photons equally. In other words, both photons strike the fore and aft walls simultaneously according to both observers. Not only that, you will be contradicting every single diagram of the relativity of simultaneity thought experiment that I've ever seen, which all clearly show that the point of emission remains stationary relative to the outside observer.

So if you adhere to Relativity, Statement 2, with which you seem to agree, can only be taken to indicate that the point of emission remains stationary relative to each observer. If you interpret it otherwise, you destroy the relativity of simultaneity. And if Relativity is valid, Statement 2, which is clearly correct regardless of whether Relativity is valid or not, contradicts Statement 1, thereby invalidating Relativity, since it's physically impossible for Statement 1 to be false.

Also note that, from the viewpoint of the stationary observer, the 90-degree photon will NEVER strike the sensor, while from the viewpoint of the spaceship observer, the 45-degree photon will NEVER strike the sensor. This shows that they can NEVER agree which of the two photons strikes the sensor. Yet one MUST strike the sensor, and the other not. So this is not a question of the order in which they both strike. It's a question, a disagreement between observers, over which photon strikes where, not the order in which they strike.

Based solely on two statements on which you and I seemingly agree, and containing none of the assertions I earlier made regarding Relativity which you say Relativity does not make, I have proven my argument. Relativity is invalid. The inability of Relativity to take both of these statements together as correct is exactly the reason Special Relativity's two main thought experiments (time dilation and relativity of simultaneity) cannot successfully be combined.

And all of the assertions I previously made, even if I worded them somewhat incorrectly or didn't quite get across what I was saying, follow from the above two statements.

Please correct me if you don't agree with those two statements, or can show how you can accept both of them as correct, as you do and I know most relativists do, yet still maintain that Relativity is a valid theory.

KH wrote:

OK, to start with, yes, we agree on statements 1 and 2 -- no problem. And for brevity I'm referring to Special Relativity as "SR".

You: "I believe that you're conflating the source with the point of emission."

I don't know what this means. I am, indeed, referring to the same thing when I say source and point of emission. But I'm trying to understand your distinction. I'll keep reading...

You: "Statement 2 shows that each observer regards the point of emission of the photon as remaining stationary relative to himself."

Not true--the stationary observer sees the point of emission (or source or whatever) moving with the ship. I don't see anything in statement 2 that contradicts this. I still don't get the difference you're making between the "point of emission" and "the source". Let's talk about ONE of the two and forget the other, because I don't see the difference.

Let me try it this way: When a photon is created by whatever process creates it (electromagnetic reaction, nuclear decay or whatver), let's call that the "source". At that point, it has a speed and direction. That direction can later be changed by refraction or reflection, but for our purposes let's agree that that's not happening with our photon P1. NOW.. without any disagreement with statement 1 or 2, classical physics (where we agree) says that the photon's DIRECTION will be straight up in the spaceship's frame, and heading at an angle in the stationary frame, and SR does NOT refute that. SR doesn't claim that the source, point of emission, or whatever you want to call it, is stationary in the stationary observer's frame. It's DEFINITELY moving with the ship. And the DIRECTION of the photon (but not its speed) is determined by the ship's speed relative to the stationary observer. So the photon is moving upward at an angle from vertical which depends on the ship's speed.

Reading further, you anticipated my argument and then said, "But by doing so, you destroy the relativity of simultaneity." How so? I read the rest of that paragraph carefully, and I simply don't see it. Maybe you can point me to some of these thought experiments that show that the souce is stationary in the stationary observer's frame. It's not true. I've been studying SR (on and off) for many years--I've never seen that assertion.

KH wrote:

One more reply...

In your statement, "But by doing so, you destroy the relativity of simultaneity," and later "In other words, both photons strike the fore and aft walls simultaneously according to both observers," I think you misunderstand what the relativity of simultaneity is. It DOES NOT say that simultaneous events are simultaneous in all reference frames--quite the opposite. Put in a nutshell, it says "trailing clocks run ahead." So the stationary observer sees the aft-directed photon striking the back wall BEFORE the foreward directed photon strikes the front wall. That DEMONSTRATES the relativity of simultaneity--it doesn't destroy it. Simultaneity itself is relative. I'd love to delve into this in more detail because I think it's one of the most misunderstood aspects of SR, but I think I've already said plenty in this response. :-)

If you've read or seen anything in disagreement with the above, that material is in error. Once again, I encourage you to view the following course which does a truly excellent job of explaining SR: http://www.worldscienceu.com/courses/university/special-relativity You can view the course with or without the mathematics that support it--you can choose. It takes a while (perhaps several days, if you take the time to digest everything carefully)--especially if you do all the exercises (in the math version, which I took), but it should clarify the things I've been trying to explain in our little discussion here. By the way, I have no personal connection whatsoever with the company or any of the people who produced this.

Scott Reeves wrote:

Thanks again for the comments. They're really helping me to clarify my argument and double-check myself. I notice that you've posted a few comments on this and other videos before I'd posted this reply, so I'll get to your other reply, made before you've had a chance to read this one, after this. Just keep in mind that the following is written before I've had a chance to read or respond to your second comment.

"I am, indeed, referring to the same thing when I say source and point of emission. But I'm trying to understand your distinction. I'll keep reading..."

That's probably the main source of our disagreement lies, then. My argument basically depends upon the distinction between the two, and if you don't see the difference, then you won't understand what I'm saying and will disagree with me. You may disagree with me anyway, but at this point, I think that's why we disagree.

"Not true--the stationary observer sees the point of emission (or source or whatever) moving with the ship. I don't see anything in statement 2 that contradicts this. I still don't get the difference you're making between the "point of emission" and "the source".

You're confirming that this is indeed the source of our disagreement. I'm distinguishing between the two, and you're not. And it's not anything in Statement 2 itself that causes contradiction. It's both statements taken together.

"Let's talk about ONE of the two and forget the other, because I don't see the difference."

We CAN'T do that. Relativity's failure to take the point of emission into account, instead conflating it with the source/device of emission, is the crux of my argument.

"classical physics (where we agree) says that the photon's DIRECTION will be straight up in the spaceship's frame, and heading at an angle in the stationary frame, and SR does NOT refute that."

I agree with that, which is why I said that Statement 2 is true regardless of whether Relativity (SR and GR) is valid. I don't think any intelligent person can possibly disagree with either statement. You might disagree with the conclusions I draw from them, and I might disagree with the conclusions you draw from them, but the basic statements themselves shouldn't bother anyone.

"SR doesn't claim that the source, point of emission, or whatever you want to call it, is stationary in the stationary observer's frame. It's DEFINITELY moving with the ship."

I agree that SR doesn't claim that the source is stationary in the stationary observer's frame (we're agreeing, of course, that we're not looking at this from the spaceship observer's viewpoint, who COULD consider himself to be the stationary observer).

But as I've been saying, I don't agree that the source and the point of emission are the same thing. The source is the device/object that emits the photons. To me, the point of emission is the location, defined by the coordinate system of any given reference frame, where the source is located when it emits any given photon or sphere of light. The photon then races away from, or the sphere of light expands from, that particular point, which remains fixed for the observer at rest relative to that coordinate system (reference frame). But the source does not necessarily remain at that location. If it's not in motion relative to the coordinate system, it does remain at the point of emission. If it isn't at rest relative to that coordinate system, then the source moves away from the point of emission. Thus the point of emission ALWAYS remains stationary relative to any given observer, while the source may or may not.

And note that when I talk about the sphere of light, or wave of photons, or whatever you want to call it, I'm only talking about a single emission event, whether that event is the emission of a single photon, or a spherical wave of photons, such as from a light bulb, that expands outward, a sort of spherical "shell" of photons, which all MUST remain equidistant from the point of emission, if the speed of light is constant. I'm not talking about a continuous series of emission events, where one wave after another is emitted from the bulb or source. That just complicates things. I mean the source just flicking on

for an instant, long enough to emit a single photon (if it's a laser/photon gun, for instance) or a sphere of photons (if it's a light bulb, for instance), then back off again.

So the point of emission is not a device or an object. The device or object doing the emitting is the source. The point of emission is basically a location in space, a coordinate point, that is stationary relative to any given observer. Every reference frame APPEARS to have its own point of emission when the source emits photons. The difference between Relativity's and my viewpoint is that Relativity tries to treat all emission points as equally real. Statements 1 and 2, both taken as true, show that all points of emission cannot possibly be equally real as Relativity requires.

All that being said, say we have a light bulb that goes whizzing past a stationary observer and emits a burst of light at a certain point. The expanding sphere of light that is produced MUST remain stationary relative to the stationary observer, since all the photons are expanding at the same speed from a common point (the center of the sphere, AKA the point of emission), shooting outward in all directions, 360 degrees around the point of emission. However, the light bulb (the source) can speed away from the sphere, and emit another sphere some distance away, a sphere that will expand from THAT point of the stationary observer's reference frame, even as the light bulb continues moving on.

If the expanding sphere of light were to move along with the light bulb, with ALL observers agreeing that the sphere's expansion is centered on the light bulb), then the photons comprising the sphere would all have to be moving faster than light from the viewpoint of the stationary observer, as they all have to maintain the same distance from the central point, as the photons move at light speed. The sphere's speed, and by extension the photons that comprise it, would therefore have to be light bulb speed + c relative to the stationary observer.

You say that taking into account time dilation and length contraction resolves this. But it's irrelevant whether or not you take them into account, because the moving sphere sacrifices the relativity of simultaneity, since if you take two oppositely directed photons moving parallel to the bulb's direction and you apply length contraction and time dilation, you apply them equally to the path of both photons and the photons themselves. They're affected equally. Both photons traverse the same path in the same amount of time. So length contraction and time dilation are irrelevant to the issue. It doesn't matter if I've ignored them. If the light bulb is located at the center of the cube-shaped ship I use in my animations, then both photons will hit the fore and aft wall simultaneously according to the stationary observer and an observer inside the ship, regardless of length contraction and time dilation.

So in the example we've been discussing, the point of emission, and by extension the sphere of light, CAN'T move along with the source from the observer's point of view else Relativity is invalidated because there won't be relativity of simultaneity.

And if the sphere of light remains stationary relative to the stationary observer, then the photon which strikes the sensor on the moving spaceship will be the photon on the sphere located at a 45-degree angle relative to the point of emission.

Meanwhile, the spaceship observer will claim that the point of emission remains located at the same coordinates as the source, since he considers both himself and the source to be stationary. Neither the point of emission nor the source have moved relative to him, so he believes that the photon which strikes the sensor is the one at a 90-degree angle to the point of emission.

If Relativity is to be taken as valid, then Statement 2 in conjunction with the relativity of simultaneity shows that the point of emission must remain stationary relative to whatever observer you're considering. They disagree over which is the real point of emission, each claiming theirs is the actual, real point of emission, and so they must disagree over which photon strikes the sensor. And since it's physically impossible for Statement 1, which says that they CAN'T disagree over which photon strikes the sensor, to be false, then Relativity itself MUST be false.

Hopefully I've gotten across what the point of emission is, and the distinction between the source and the point of emission. If you don't agree that the point of emission exists, and that it's distinct from the source, I think we're at an impasse, because I don't see that it's possible for it NOT to exist, and for it to be distinct from the source.

And if you DO see what I'm saying about the point of emission, and you agree that it exists and is distinct from the source, then as far as I can tell, the only way to save Relativity is to somehow demonstrate that the 45-degree photon and the 90-degree photon are the same photon, which seems to me would involve demonstrating that at the instant the photon in question strikes the sensor in the moving spaceship, the sensor is actually located directly above the stationary observer's point of emission, at the 90 degree position. Some sort of co-ordinate transformation or something, a twisting of spacetime. I don't know. I don't think such an attempt would be successful.

"Maybe you can point me to some of these thought experiments that show that the souce is stationary in the stationary observer's frame."

Here are several examples of the diagrams to which I was referring in my last response. These are some of the easiest to see what I'm talking about. They do not show that the source is stationary in the stationary observer's frame. Neither of us is claiming that it is. They do show that the point of emission is stationary relative to whatever reference frame you choose, and that's my point. If the source is a light bulb, a laser/photon gun, whatever, located at the center of the vehicle in the diagrams, that device clearly must be moving on with the vehicle, even as the vehicle races away from the point in space at which the photons were emitted from the source/device from the viewpoint of the stationary observer. They're all clearly showing a distinction between the source and the point of emission. Some of them even show the point of emission as a dot sandwiched between two outward-moving photons. In particular note the third one; it's very clear in

that one that the source and the point of emission are not the same thing, and that each observer has a point of emission that remains stationary relative to him. In the third diagram, the source is a light bulb, and the point of emission in the stationary frame is the point where the bulb WAS located when the photons were emitted.

https://www.google.com/search?q=relativity+of+simultaneity&rlz=1C1AOHY_enUS708US708&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiDgPWijZfXAhUr7IMKHY2zAH8Q_AUICygC&biw=1600&bih=742#imgrc=hZ_gvlePOoQJKM:

https://www.google.com/search?q=relativity+of+simultaneity&rlz=1C1AOHY_enUS708US708&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiDgPWijZfXAhUr7IMKHY2zAH8Q_AUICygC&biw=1600&bih=742#imgrc=_nfCffrKcA-3zM:

https://www.google.com/search?q=relativity+of+simultaneity&rlz=1C1AOHY_enUS708US708&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiDgPWijZfXAhUr7IMKHY2zAH8Q_AUICygC&biw=1600&bih=742#imgrc=Vuj8Ma1GZRljhM:

The point of emission is there in all the diagrams. It's shown in both reference frames, and it's clearly stationary relative to the observer in that particular reference frame. But it's rarely if ever mentioned, which is odd, because it should be a glaringly obvious that it's crucial to the truth or falsity of Relativity. And it obviously can't be the same as the source, the device that emitted the photons, because in the frame that shows the stationary observer's viewpoint, it's never centered on the source, but on a point from which the source is racing away.

Those diagrams do not work if you take into account the point of emission and consider those photons as being part of an expanding sphere of light centered on the point of emission. Which is why I say SR cannot successfully combine its two main thought experiments, and because it can't, Relativity is an invalid theory.

Scott Reeves wrote:

You added another response after I had written the preceding but before I'd had a chance to post it, so I'll now address your later comment.

"In your statement, "But by doing so, you destroy the relativity of simultaneity," and later "In other words, both photons strike the fore and aft walls simultaneously according to both observers," I think you misunderstand what the relativity of simultaneity is. It DOES NOT say that simultaneous events are simultaneous in all reference frames--quite the opposite. Put in a nutshell, it says "trailing clocks run ahead." So the stationary observer sees the aft-directed photon striking the back wall BEFORE the foreward directed photon strikes the front wall. That DEMONSTRATES the relativity of simultaneity--it doesn't destroy it. Simultaneity itself is relative."

I agree with all you say here except the part that I misunderstand the relativity of simultaneity. I don't know if my previous response, which you haven't yet had a chance

to read because I haven't posted it yet, clears up what I'm saying. I'm NOT saying that Relativity says that simultaneous events are simultaneous in all reference frames – it doesn't, as you say. I'm saying that if you try to have the point of emission move along with the source, then simultaneity is no longer relative, because even with time dilation and length contraction, the forward and aft photons strike the walls at the same time according to all observers. For the moment, I'll assume that my first post clears up what I'm saying.

"If you've read or seen anything in disagreement with the above, that material is in error."

I haven't read anything in disagreement with it. I don't even disagree with it myself, except where I noted.

Just as another illustration of what I mean by the point of emission: the point of emission is that point in coordinate space away from which any observer considers the photon to be moving. The stationary observer says the photon follows an angled path because he's drawing photon's path from that point. If he were to consider the point of emission as moving along with the source, then he would trace the path of the photon differently. He would say the upward directed photon is moving straight upward from the point of emission, in keeping with the spaceship observer, and would draw the path straight upward from the source, rather than at an angle, exactly as would the spaceship observer. This would prevent the stationary observer from claiming that time is dilated, as the time dilation equation is based on path being angled for the stationary observer and straight up and down path of the spaceship observer.

KH wrote:

OK, I looked at those links, and I think I see what you mean by "point of emission". That's the point in time and space where the stationary observer sees the photon being emitted, and he can mark that point in his own reference frame--right? And, he sees all light that was emitted from that point expanding in a sphere (in the case it was emitting in all directions). I agree with that. And I agree that the sphere in the stationary frame stays centered around that "point of emission". BUT, that doesn't mean all the photons in the sphere are directed outwardly in a uniformly distributed pattern. They are not. Read on.

You: "He would say the upward directed photon is moving straight upward from the point of emission, in keeping with the spaceship observer, and would draw the path straight upward from the source, rather than at an angle, exactly as would the spaceship observer."

NO! And here's where we disagree: the upward directed photon is not directed upward in the stationary frame. None of the links you pointed to show anything about photons moving in a direction perpendicular to the direction of motion.

In the case of the sphere, in the stationary frame the front of the sphere is more densely packed with photons (the light is brighter) than the rear of the sphere. Similarly there's a

blue doppler shift (shorter wavelength, higher frequency) in the photons moving forward and a red-shift (longer wavelength, and lower frequency) in the photons moving aft. And the distribution of photons in the sphere is definitely NOT uniform--as I said, more are moving forward than aft.

Here's a thought experiment: Forget the sphere for a minute. Picture two spaceships traveling side by side in the same direction at 80% of the speed of light, half a mile apart (actually, the distance doesn't matter.) Spaceship A aims his laser pen at spaceship B and turns it on. In the spaceships' frame, the ship's are both still, and the beam lands on the side of spaceship B. ALL the photons land on B. Period. This means the stationary observer sees the photons traveling forward at angle from perpendicular in order to catch spaceship B as it moves in the same direction.

The same applies if it's a sphere of light being emitted. Most of the photons will move forward, making the front of the sphere more densely packed with photons than the rear. But the sphere is still perfectly round and centered on the "point of emission" as you call it. But other than its round shape, it is not the SAME sphere that the stationary observer sees. Photon density, wavelength and individual direction are all different.

KH wrote:

Clarification: When I say it's not the SAME sphere, that's not exactly what I mean. Technically, it is the same sphere, set of photons, if you will, but they're no longer evenly spread. The ones in front are more densely packed and the ones in the rear are farther apart. I wish I could draw a picture here, but I think you get the idea.

You said "If the light bulb is located at the center of the cube-shaped ship I use in my animations, then both photons will hit the fore and aft wall simultaneously according to the stationary observer and an observer inside the ship, regardless of length contraction and time dilation."

This is exactly the opposite of what the relativity of simultaneity claims. SR says the rear photon will strike the rear wall first in the stationary frame. Simultaneously only in the ship's frame. That's what I meant when I questioned whether you understand the relativity of simultaneity. You said you did, but then you make this incorrect claim. I hope my explanation above makes this clearer.

I'm enjoying this--are you? You have thanked me for my remarks, and I thank you for your thoughtful consideration of those remarks, and counter-arguments. Let's continue on this level and we'll both benefit (as will any readers who happen to be watching this little debate), regardless if either of us convinces the other to change his view.

KH wrote:

One more thing...

You said "Some sort of co-ordinate transformation or something, a twisting of spacetime. I don't know. I don't think such an attempt would be successful."

Well, that is exactly it! There IS a coordinate transformation exchanging the time dimension and one of the spatial dimensions. And the "attempt" was successful--it's called Special Relativity, and it's a complete and consistent model of what we observe in the cosmos at all levels, from galactic clusters to subatomic particles. Once again, you should watch that lecture series by Brian Greene at World Science U, that I keep mentioning.

Scott Reeves wrote:

"OK, I looked at those links, and I think I see what you mean by "point of emission". That's the point in time and space where the stationary observer sees the photon being emitted, and he can mark that point in his own reference frame--right?"

Right.

"And, he sees all light that was emitted from that point expanding in a sphere (in the case it was emitting in all directions). I agree with that."

Right. And further, which you don't say so I don't know whether you agree with it or not, the "moving" observer, who also considers himself to be the stationary observer, has his own point of emission, which remains stationary relative to him as both the original "stationary" observer AND his point of emission moves on, leaving the sphere of light behind. It is not physically possible for the sphere of light to expand from both points of emission, as this would lead the observers to disagree over which photon strikes the sensor, in violation of Statement 1, which says they have to agree, and which you and I agree is a true statement.

"And I agree that the sphere in the stationary frame stays centered around that "point of emission"."

But you can't agree with that. Here's why. Let me call your above statement KH1. You further say, which I will call statement KH2: "NO! And here's where we disagree: the upward directed photon is not directed upward in the stationary frame."

From KH2 and many of your previous statements, I think you claim (correct me if I'm wrong) that if a stationary observer has two identical laser pens (I like your use of the laser pens later, so I'll use it here; it's better than my laser gun), both aimed in the same direction (straight up), both pens will fire a beam or a photon straight up relative to the stationary observer. But if one of the pens is in motion relative to the stationary observer, the pen in motion, even though it is still aimed straight up, will fire a beam angled from the vertical in the direction of motion, while the stationary pen will still fire a vertical beam.

I'll assume that you agree with that, but correct me if I'm wrong.

If KH2 is true, then KH1 cannot be true. If one photon is translated one unit from the vertical when the laser pen is in motion (as you say it is in KH2), then if we're talking about a sphere of light instead of a single photon, ALL photons must be similarly adjusted along the x axis, including the point of emission, and doing so means KH1 cannot be true.

For example, if a photon that would normally move to x=0, y=1 when emitted by a stationary source moves to x=1, y=1 when emitted from a moving source (i.e. moving at a 45-degree angle), and every photon remains a constant distance from the point of emission as they're all moving at the same speed, then EVERY photon in the sphere would have to be similarly adjusted, and to keep the sphere centered on the point of emission, the point of emission must also be similarly adjusted. Thus a forward-directed photon that would normally move to x=1, y=0 the instant after emission would instead move to x=2 y=0, which would mean that photon is moving faster than light from the viewpoint of the stationary observer. An aft-directed photon that would normally move to x=-1, y=0 the instant after emission would instead remain at the origin, seeming not to have moved after emission.

If a photon that would normally move straight upward from a non-moving source moves at an angle due to the motion of the source, then ALL the photons are offset in the direction of motion by the same amount, meaning that the sphere as a whole moves, which means that the sphere doesn't remain centered on the point of emission, but rather on the source. Unless you say that the point of emission moves relative to the stationary observer, staying at the center of the moving light sphere. And this breaks the relativity of simultaneity, because to prevent the photons from moving faster than light relative to the stationary observer, you must apply length contraction and time dilation…which doesn't actually resolve anything, since those effects are applied equally to all photons and their paths.

This is why I earlier asked you if you believe that a photon emitting from a star receding from Earth would take longer to reach us than a photon emitted from a stationary star at the same distance.

My claim is that from the viewpoint of a stationary observer, the beam of an upwardly-aimed laser pen moving at a significant fraction of light speed will curve or slant aftward from the direction of motion.

"In the case of the sphere, in the stationary frame the front of the sphere is more densely packed with photons (the light is brighter) than the rear of the sphere. Similarly there's a blue doppler shift (shorter wavelength, higher frequency) in the photons moving forward and a red-shift (longer wavelength, and lower frequency) in the photons moving aft. And the distribution of photons in the sphere is definitely NOT uniform--as I said, more are moving forward than aft."

The distribution of the photons around the sphere makes no difference. There could be a kajillion photons on the forward side and five hundred on the aft side. They all still maintain a constant distance from the point of emission, and the sphere as a whole cannot not move relative to the stationary observer.

“Here's a thought experiment: Forget the sphere for a minute. Picture two spaceships traveling side by side in the same direction at 80% of the speed of light, half a mile apart (actually, the distance doesn't matter.) Spaceship A aims his laser pen at spaceship B and turns it on. In the spaceships' frame, the ship's are both still, and the beam lands on the side of spaceship B. ALL the photons land on B. Period. This means the stationary observer sees the photons traveling forward at angle from perpendicular in order to catch spaceship B as it moves in the same direction.”

I think my earlier response tells my view on this. In your example, each time a photon is emitted from the laser pen, a new point of emission is created that remains stationary relative to the stationary observer, a new point of emission that is offset slightly in the direction of the source’s motion from the previous point. Each successive photon is thus moving at an angle relative to the most recently created point. This just creates multiple instances of the same problem. The spaceship observer says there’s a single point of emission located where the laser pen is, while the stationary observer says there are multiple points of emission spread out at regular intervals on a line along the direction of the pen’s motion, with each photon drawing its own path back to its own unique point of emission. If it were a light bulb instead of a pen, the stationary observer would say there are multiple stationary spheres each expanding from its own unique point of emission, all such points being spread out at regular intervals on a line along the direction of the bulb’s motion, while the ship observer would say there were multiple successive spheres expanding from the same central point.

“The same applies if it's a sphere of light being emitted. Most of the photons will move forward,”

If what you’re saying is correct, they will ALL move forward slightly, each one being offset slightly in the direction of motion. Yet they still remain perfectly centered on the point of emission, which logically must move forward with the sphere. This is the same thing as saying both the sphere and the point of emission move along with the source. Which destroys the relativity of simultaneity.

“But other than its round shape, it is not the SAME sphere that the stationary observer sees.”

If it’s not the same sphere, then it’s not the same photon that hits the sensor in previous examples. In his “Electrodynamics of Moving Bodies,” (1923 Edition) Einstein talks about this very subject (which I did not know until recently), Einstein says, “The wave under consideration is therefore no less a spherical wave with velocity of propagation c when viewed in the moving system.” He only talks about transforming the wave in one frame into a spherical wave in a moving frame. He doesn’t mention transforming a wave

in one frame into a similar but different wave in the moving frame. He says that the sphere of light we're talking about must have a spherical shape in both frames in order for Relativity to be valid. The same sphere, not two different spheres. Einstein claims his proof succeeds, but I'm still dissecting several essays saying that it doesn't, and I think they're right based on a quick read. Based on all that we've been talking about, I don't think a spherical wave in the stationary frame can be transformed to a spherical shape in the moving frame. I gave links to those essays in an earlier comment.

"Photon density, wavelength and individual direction are all different."

None of that makes any difference as to whether the point of emission is moving along with the source, or whether they're all equidistant from that point at any given instant. They're all still moving at the same speed away from the same point of emission.

Scott Reeves wrote:

"Clarification: When I say it's not the SAME sphere, that's not exactly what I mean."

I see what you mean. But before I saw this clarification, I wrote a response to your earlier statement that it wasn't the same sphere, so it's still in my response to the earlier comment. Just ignore it when you get to it.

In response to my saying, "You said 'If the light bulb is located at the center of the cube-shaped ship I use in my animations, then both photons will hit the fore and aft wall simultaneously according to the stationary observer and an observer inside the ship, regardless of length contraction and time dilation,' you said: 'This is exactly the opposite of what the relativity of simultaneity claims. SR says the rear photon will strike the rear wall first in the stationary frame. Simultaneously only in the ship's frame. That's what I meant when I questioned whether you understand the relativity of simultaneity. You said you did, but then you make this incorrect claim. I hope my explanation above makes this clearer.'"

Actually, what I was referring to when I said that was the case where the sphere is moving relative to the stationary observer. Earlier in the paragraph I said, "…because the moving sphere sacrifices the relativity of simultaneity, since if you take two oppositely directed photons…" I didn't mean to claim that's what SR says. I claim that's what happens when the stationary observer considers the sphere of light to be moving: the relativity of simultaneity is destroyed, because the photons strike the walls simultaneously according to both observers.

"I'm enjoying this--are you? You have thanked me for my remarks, and I thank you for your thoughtful consideration of those remarks, and counter-arguments. Let's continue on this level and we'll both benefit (as will any readers who happen to be watching this little debate), regardless if either of us convinces the other to change his view."

Yes, I like having my position challenged. This is giving me a good chance to go back and review my ideas.

Scott Reeves wrote:

“There IS a coordinate transformation exchanging the time dimension and one of the spatial dimensions.”

I think it’s going to take me longer to come up with a response to this, so I’ll hold off for now.

“it's called Special Relativity, and it's a complete and consistent model of what we observe in the cosmos at all levels, from galactic clusters to subatomic particles.”

I don’t want to open that can of worms right now.

KH wrote:

You said: "I didn’t mean to claim that’s what SR says. I claim that’s what happens when the stationary observer considers the sphere of light to be moving: the relativity of simultaneity is destroyed, because the photons strike the walls simultaneously according to both observers."

But that's exactly what I'm trying to refute. The two observers do not observe the sphere striking the fore and aft walls at the same time. It's only simultaneous in the ship's frame. The "sphere" in the stationary frame is "time-shifted" from the ship's sphere. In other words, the ship observer would say, "hey! that's weird--what you (stationary observer) are calling a sphere is doesn't correspond to any sphere I saw at ANY point in time. Each part of your sphere came from the expanding sphere I observed at different points in time, from my perspective." This touches on the coordinate transformation I was talking about.

Scott Reeves wrote:

“But that's exactly what I'm trying to refute.”

I know that’s what you’re trying to refute. And I’m trying to show you why it’s impossible to refute. If either observer regards the sphere as being in motion relative to himself, then they will both agree that the photons hit the front and rear walls simultaneously, thus invalidating Relativity. But if each observer regards the sphere as remaining stationary relative to himself, then they will disagree on which photon strikes the sensor on the ceiling of the ship. It’s not a matter of them agreeing or disagreeing on the TIMING of the sensor strike. They disagree on which of two objects strikes the sensor. Which also invalidates Relativity, as it’s physically impossible for them to disagree on that.

“The two observers do not observe the sphere striking the fore and aft walls at the same time. It's only simultaneous in the ship's frame.”

I agree that’s what Relativity claims. I’m saying that claim can only be true if the sphere is motionless relative to the stationary observer. If the stationary observer says the sphere is moving, then Relativity’s claim can’t be true..

“The "sphere" in the stationary frame is "time-shifted" from the ship's sphere.”

How is that not the same thing as saying that the sphere is in motion relative to the stationary observer? It’s either another way of saying the sphere is moving relative to the stationary observer, or it’s a way of saying that the stationary observer’s sphere is the spaceship observer’s sphere, only in the future of the spaceship observer (meaning the spaceship observer’s future is the stationary observer’s past).

If it’s another way of saying the sphere is in motion relative to the stationary observer, then the relativity of simultaneity is still destroyed just as I’ve described.

But if it’s another way of saying the arrow of time is pointing in opposite directions in each frame, the stationary observer would say, “My sphere isn’t the spaceship’s sphere in the spaceship observer’s future. The spaceship observer’s sphere is MY sphere in the future. Meaning my sphere is collapsing (all photons moving toward its center rather than away from it).”

So the “opposing arrows of time” thing may eliminate the disagreement over which photon hits the sensor, (I think; I’m still a bit confused over this possibility, as it’s the first time I’ve ever considered it as a resolution), where the point of emission is located, and whether or not the sphere is moving relative to one of the observers, and it may even preserve the relativity of simultaneity. So everything looks okay.

But it raises a new problem. It also means that the stationary observer sees photons moving in from the depths of the universe, converging on where the laser pen, light bulb, or whatever “source” you choose, WILL BE. I put “source” in quotes, because how can such an object be said to be the source of the light? It would actually be an absorber or an “attractor” of light, not an emitter of it.

OR there’s a third possibility of what I think you might mean, described below (very last paragraph of this response).

(I like this sort of speculation, by the way. It’s the sort of thing that makes me wish Relativity actually were true).

“In other words, the ship observer would say, "hey! that's weird--what you (stationary observer) are calling a sphere is doesn't correspond to any sphere I saw at ANY point in time. Each part of your sphere came from the expanding sphere I observed at different

points in time, from my perspective." This touches on the coordinate transformation I was talking about."

But the ship observer can't say that and be correct (unless you're talking about the "arrow of time" thing I just mentioned). According to the stationary observer, the photon located at 90 degrees above the center of the sphere NEVER strikes the sensor on the ship. Instead, he says the photon located at 45 degrees relative to the center of the sphere strikes the sensor. Meanwhile, according to the spaceship observer, the photon located at 90 degrees above the center of the sphere strikes the sensor, while the photon located at 45 degrees relative to the center NEVER strikes the sensor. The photon which each observer says strikes the sensor can NEVER strike the sensor. It's not a matter of, "We both see the same photon strike the sensor, we just see it strike at different times." It's not a matter of them disagreeing WHERE the sensor is struck in each of their coordinate systems. THAT can be reconciled with a coordinate transformation. What can't be reconciled with a coordinate transformation is WHICH photon strikes the sensor.

It seems to me that what you're saying the ship observer would say could be rephrased as, "We agree that the exact same photons comprise the sphere that each of us sees, and we each see the exact same sphere, but we completely disagree as to the position of each photon in that sphere relative to the center of that sphere." This is like saying, "We're both looking at the exact same face, made from the exact same atoms, but the atom you see at the tip of the nose is actually located on the bottom of the right earlobe from my point of view. In fact, NONE of the atoms you see making up the face is located on the face where you say it is." That's physically impossible.

OR are you saying that if the stationary observer says, "This is what my sphere looks like at time X on my clock," the spaceship observer will say, "The front half of my sphere (for example) looks like that at time X, while the back half looks like that at time Y"? In other words, the halves of the spheres look the same simultaneously in one reference frame, but not in the other? (IF that's even a legible description of what I'm trying to say).

KH wrote:

OK, that was a long response, but I think this is the gist of it: "How is that not the same thing as saying that the sphere is in motion relative to the stationary observer? It's either another way of saying the sphere is moving relative to the stationary observer, or it's a way of saying that the stationary observer's sphere is the spaceship observer's sphere, only in the future of the spaceship observer (meaning the spaceship observer's future is the stationary observer's past)."

And, to that, I say, no, it's not the same thing. First of all, the sphere is not "stationary" to either observer; it's expanding at the speed of light. I know you don't mean to claim that, but that's what your words are saying; so I want to be clear about that in my rebuttal. Here goes:

Let's imagine it this way: Pretend that bulb emits a sphere that changes color as it expands. When it's very close to its source, it's red, and it gradually changes to violet, going through the colors of the rainbow as it expands to hit the four walls of the ship. So the color of the sphere at any point in time indicates how old it is and how far it is from the source. All this in the ship's frame where "point of emission" and "source" are the same thing. (And I'm not talking aobut Doppler shipfting; ignore that for now.) So, when the sphere strikes the walls,front and back, it's violet--a particular shade of violet indicating the age of the sphere. Now, your argument would be, "Hey, the stationary observer cannot disagree that the sphere was violet when it hit both the walls." Right? And, guess what?

I agree! But here's what happens in the staionary frame. The rear of the sphere changes color FASTER than the front, due to the relativity of simultaneity ("trailing clocks run ahead"). By the time it touches the rear wall that part of the sphere is indeed violet. But the front of that sphere changes colors more slowly for the same reason (relativity of simulaneity), and is still in an earlier part of the rainbow, perhaps yellow. At this instant, the sphere looks like part of a rainbow (a gradient from yellow in front to greento blue to indigo to violet at the rear where it just touched the rear wal). But the colors are changing as the sphere expands and as the ship moves forward and by the time that sphere expands to touch the front of the ship, that front part has changed to violet--just in TIME (pun intended.) At this point the rear of our stationary-frame sphere is well aft of the rear wall, and its color is now in the ultraviolet part of the spectrum. (Again, this is not Doppler shifting, which we are ignorming, it's just part of our imaginary thought experiment, where we use color to indicate age.)

So, even though I said earlier that the two observers see the same sphere; well, not exactly. This rainbow-colored sphere (in this example) is never seen by the ship's observer. In the stationary frame, different parts of the sphere are all different "time-shifted" versions of the ship's expanding sphere.

Your arguments assume that the two observers see the same sphere at some point in time. But SR says they never observe the same sphere (read "same color" in the above example) at any point in time, with the single exception of the instant of emission, when the "spere" is still a tiny dot.

KH wrote:

You: “I don’t want to open that can of worms right now.", when referring to the transformation of coordinates.

Sorry, but you already opened it, whether you meant to or not. This is the essence of our discussion. I hope that once you see it, you'll understand why SR is correct. Have you looked at the Brian Greene course yet?

KH wrote:

You: " It’s not a matter of them disagreeing WHERE the sensor is struck in each of their coordinate systems. THAT can be reconciled with a coordinate transformation. What can’t be reconciled with a coordinate transformation is WHICH photon strikes the sensor."

I already addressed this with my bullet analogy and SINGLE photon discussion. They do agree on which photon strikes the sensor--they just don't agree on that photon's direction or its age at the instant of impact.

When you say "coordinate transformation" you're talking about a linear transformation in the x-coordinate (the direction of motion) in the x-y-z system. When I talk about "coordinate transformation" I'm talking about a linear AND rotational transformation in both the x coordinate AND the t coordinate in the x-y-z-t four-dimensional system (t is the time coordinate). These two coordinates are rotated with respect to the y-z plane -- something that's difficult to envision, but the math works. The degree of "rotation" increases with the relative speed between the two systems. There is no difference in the y- or z- coordinates in the two frames, as these two directions are perpendicular to the direction of motion.

Scott Reeves wrote:

Okay, now I see what you meant by time-shifted. That was an excellent example. So excellent that I’ve tried several tentative responses to it and am not yet confident enough in any one of them to post it yet.

I’ve got a few questions. I noticed you restricted your example to the front and rear walls. What do you think happens to the angled photon? Does the stationary observer believe it strikes the sensor on the ceiling at the same time as either of the front or rear photons? Or do they all three strike at different times?

And if the rear-moving photon is violet when it strikes the rear wall, and the forward-moving photon is violet when it strikes the front wall, then since the rear path is shorter than the front path, the “age” of the photons can’t depend upon the length of the path they follow. Does the age depend on the angle relative to each observer’s point of emission? And if so, on the front half of the sphere, do the photons reach “violet” more slowly the closer their angle gets to zero, i.e. y=0, while on the rear half of the sphere, the photons reach “violet” more quickly the closer their angle gets to 180? Or does their age depend only on the motion of the source, and if that’s the case, why aren’t all photons affected equally?

Scott Reeves wrote:

“Sorry, but you already opened it, whether you meant to or not. This is the essence of our discussion. I hope that once you see it, you'll understand why SR is correct.”

Actually, I said that I didn't think a coordinate transformation wouldn't work as an attempt to explain away the subject we're currently discussing, which I believe is the reason Relativity doesn't work from the get-go. To which you responded that the attempt was SR. The can of worms I referred to was opened when you added that SR was "a complete and consistent model of what we observe in the cosmos at all levels, from galactic clusters to subatomic particles." But regardless of who opened the can, what I meant was that I didn't want to start playing around with the worms right now. It's not that I would mind it; it's just that I'm barely having enough time to keep up with our current discussion without widening it to related but different topics.

That being said, in retrospect maybe I should clarify by saying that, even if I agree for the sake of argument that Relativity is a complete and consistent MODEL of what we observe in the cosmos at all levels, it's arguable that that model represents reality, as it's not the only possible model. There's a difference between working models and reality.

Scott Reeves wrote:

"I already addressed this with my bullet analogy and SINGLE photon discussion. They do agree on which photon strikes the sensor--they just don't agree on that photon's direction or its age at the instant of impact."

You may have already addressed it, but you didn't convince me that you had resolved it. That's why I keep bringing it back around to that. It doesn't mean that you didn't adequately address it and I'm just too stupid to realize it (which I would disagree with, obviously). It just means you didn't convince ME, just like I doubt that I convinced YOU. Which is okay, because as you said earlier, "Let's continue on this level and we'll both benefit (as will any readers who happen to be watching this little debate), regardless if either of us convinces the other to change his view."

"I hope that once you see it, you'll understand why SR is correct."

You said that in reference to the transformation of coordinates. If I do ever see it and acknowledge that the transformation of coordinates resolves "the problem" (my description) we're discussing, I can accurately predict that I will not then understand why SR is correct, if by "correct" you mean something that represents the real universe in which we live. That's where that can of worms I mentioned earlier comes in.

"Have you looked at the Brian Greene course yet?"

I intend to eventually, but I haven't had time to get around to it yet. I've been reading popular science books on Relativity, including a few by Brian Greene, and textbooks on Relativity for twenty years now, so I doubt that at this point one series of videos would completely change my view. Not that I'm closed to watching it; it looks interesting and I WILL watch it. I just can't say exactly when. I have too many other more enticing things clamoring for my attention (this discussion, for one). The new Thor movie is another. Also, the older I get, the more I'm losing interest continuing to study Relativity and

develop my arguments against it. At some point I'm probably just going to step back from it and let the stuff stand or fall as it is. I'm almost fifty and need to start concentrating on other things.

KH wrote:

Thank you for the compliment--I was kind of proud of that example. :-)

Question about the wall sequence: In the stationary frame, the photons hit the walls in this sequence: rear, then top and bottom, and finally, front.

Question: "Does the age depend on the angle relative to each observer's point of emission?" No. The age is determined by the distance from the point of emission. So, the stationary observer does NOT agree that color indicates age. At any instant he observes a sphere that is multicolored (using our example), but all those photons are the same age, because they're all equidistant from the point of emission (I'm glad you made the "point of emission" vs. "source" distinction).

Question: "on the front half of the sphere, do the photons reach "violet" more slowly the closer their angle gets to zero, i.e. y=0, while on the rear half of the sphere, the photons reach "violet" more quickly the closer their angle gets to 180?" . Yes. It's a continuous variance as you move around the sphere from rear to front.

Question: "Or does their age depend only on the motion of the source, and if that's the case, why aren't all photons affected equally?" No. The movement of the source affects the DIRECTION of the photons but not their speed. I think I made this point in an earlier post.

KH wrote:

You: "There's a difference between working models and reality."

Well, that's true; however, I believe in the model because I do think it's the only model that explains all the things that have been observed experimentally. And, for the last 100 years, all experiments to confirm or refute the model have held up in support of it. (I know you don't agree with that, and I think it's unlikely discussion between us can resolve that. But maybe, if you can now agree that the model is feasible and consistent, you'll change your view.)

KH wrote:

You: "Also, the older I get, the more I'm losing interest continuing to study Relativity and develop my arguments against it. At some point I'm probably just going to step back from it and let the stuff stand or fall as it is. I'm almost fifty and need to start concentrating on other things."

Well, I've been interested in this topic for almost 50 years. (I'm 70). I've seen a lot of people posting arguments about why they think SR is hogwash, and upon challenging them, they turn belligerent and resort ad hominem attacks, etc. You're the first one I've engaged that has argued intelligently. Thanks for that. You've certainly kept my brain cells active!

Scott Reeves wrote:

Okay, after days of mulling possible responses, here is the response to your time-shifted rainbow light sphere that I've finally settled on. I still think it's a really good example, one I'd never thought of or encountered, and I'll probably be thinking it over for a while. it's really given me a headache trying to figure out a way I can disagree with it, but I think I've found one.

Call the photon striking the midpoint of the rear wall Event A. Call the photon striking the midpoint of the front wall Event B. Call the angled photon striking the midpoint of the ceiling Event C.

The spaceship observer makes three statements, all of which he regards as true, and each of which MUST be a physically TRUE statement about the condition of his world.

Note that the color of each particular photon (violet in your example) when it strikes its respective wall is irrelevant because this rebuttal works without it. It also works with it, but I'm going to leave it out, since it just makes a fourth statement necessary, needlessly complicating this.

First (call this statement A), without making any reference to the timing of events A and B, the spaceship observer says, "When event A happens, event C is happening at that same moment."

Second (call this statement B), without making any reference to the timing of events A and B, he says, "When event B happens, event C is happening at that same moment."

Third (call this statement C), making a direct reference to the timing of events A and B, he says, "Events A and B happen at the same time."

The stationary observer, because he knows that events that are simultaneous in one frame aren't simultaneous in the other, and because he knows that Statement C is the only reference to the simultaneity or lack of it of events A and B, and hence the only statement he can "legally" disagree with, seizes on statement C and says, "Spaceship observer is wrong. Events A and B do not happen at the same time."

For the spaceship observer, event C can only occur when event A or B happens. Event C doesn't occur at any other time for the spaceship observer.

IF BOTH OBSERVERS ARE TALKING ABOUT THE SAME LIGHT SPHERE AND THE SAME TRIO OF EVENTS, which Relativity requires them to be in order to demonstrate the compatibility of the principle of relativity with the principle of the constant velocity of light, then the stationary observer MUST agree that event C can ONLY happen at the same time as either event A or B, because event C definitely happens for both observers, and for the spaceship observer, in keeping with statements A and B and the perfect sphere they're discussing, that happening only occurs simultaneously with events A and B. In the spaceship's reference frame, event C can't occur after either one or both events A and B, and it can't occur before either one or both.

Since events A and B are non-simultaneous for the stationary observer, event C only has two opportunities to occur in the stationary frame: when event A occurs, or when event B occurs.

The stationary observer then asks, "In my frame, does event C occur with event A? No, it can't, because the path the angled photon follows is definitely not the same length as the path the rear-moving photon follows. In my frame, A happens before C. So does event C occur with event B? No, it doesn't."

You earlier agreed that it doesn't, and my understanding has always been that it doesn't, either. Animations of the Michelson-Morley experiment even show that it doesn't, and I assume calculations would bear this out.

Since event C can't possibly happen at the only two times it CAN possibly happen IF Relativity is to be considered a valid theory, then Relativity cannot be considered a valid theory.

KH wrote (On The "no photon is an island" problem of special relativity video before I responded to his previous two comments):

Scott, in this video, you have actually demonstated the relativity of simultaneity, which says (briefly), "Trailing clocks run ahead." As I've said in reply to your other videos, BOTH observers are correct. In the stationary frame, photons do NOT all hit the spherical wall at the same time, and this is in complete agreement and predicted by SR. In the ship's frame they DO all hit the wall at the same time. The problem is, the two observers do not and CANNOT agree on what things are simultaneous when they happen close enough in time and far enough apart in space, as they do in your animation here. Here's a killer for you. If you assume that all the walls are perfect mirrors, and the photons are directed back toward the light bulb, they will ALL arrive at the same time, in both reference frames. (The math that proves this is rather complex algebra.) But this is exactly what you'd expect: Now that there's no distance between the events, everyone agrees that the reflected photons all arrive back at the light bulb simultaneously, all in perfect agreement with SR.

Scott Reeves wrote:

The following response is written before you've had a chance to read my comments to your previous two comments, as I haven't had a chance to post them yet.

"Scott, in this video, you have actually demonstated the relativity of simultaneity"

Yes, I have. But if you'll note, in this video (which I had to watch again to make sure I still agreed with it (which I do), as it's three years old and I haven't watched it since I made it), at about the 4:24 mark, I said, "These photons cannot move along with the ship." About a minute later, I said, "If there's ever motion, this ring will never be able to be superimposed, and so there will never be simultaneity," and it should have been obvious that I meant "motion of the ship" and "superimposed on the walls of the ship," even though I neglected to say that. What I was actually getting trying to get across (but possibly didn't; keep in mind that this video was made about three years ago, when I was still working out the kinks in this) was that if the sphere were to move along with the ship rather than remaining stationary relative to the stationary observer, then the relativity of simultaneity is destroyed. And unless the sphere is moving along with the ship from the viewpoint of the outside observer, then the observers will not agree that the same photon is striking the upper sensor, which violates Statement 1 that we both agreed was correct in our comments on the other video. But I don't disagree that simultaneity is relative in the case of each observer claiming that the sphere is stationary relative to him. Except that I actually DO disagree that it's relative, because for it to be relative, they have to disagree about which photon hits the sensor in the ship, which ultimately boils down to a disagreement between the observers as to whether the point of emission is moving relative to themselves, which is what I've been saying in the other comments. If either observer regards it as moving relative to himself, then the relativity of simultaneity is broken, and if they DON'T regard it as moving relative to one of them, then they disagree on which photon strikes the sensor, thereby violating the truth of Statement 1, which we both agree can't possibly be false. Either way, they violate Relativity, and so it can't be a valid theory.

"If you assume that all the walls are perfect mirrors, and the photons are directed back toward the light bulb, they will ALL arrive at the same time, in both reference frames."

I agree, they will. That's because you're considering the round trip of the photons, and round-trip, all observers agree that both photons get back to the spaceship observer at the same time regardless of whether the point of emission is moving or not, so the round-trip is irrelevant what I'm saying. I'm talking about the one-way journey, from the POINT OF EMISSION to the walls, not from the POINT to the walls and back to the SOURCE.

KH wrote:

You: "But I don't disagree that simultaneity is relative in the case of each observer claiming that the sphere is stationary relative to him. Except that I actually DO disagree that it's relative, because for it to be relative, they have to disagree about which photon hits the sensor in the ship, which ultimately boils down to a disagreement between the

observers as to whether the point of emission is moving relative to themselves, which is what I've been saying in the other comments."

Well, the sphere isn't stationary in either frame, it's expanding at lightspeed; however I'm sure you didn't mean that. :-)

Anyway, I made this point in my last answer in the other video, but I'll do it again: Both observers agree that the sphere is centered on that point in space time that you call "the point of emission". No argument; I totally agree. However, both observers do NOT agree that all the photons in that sphere are heading in the same direction. A photon heading straight up in the ship's frame is heading at a forward angle (something less than 45 degrees) in the stationary frame. So the photons in the sphere that the stationary observer sees are more densely packed in front than they are in the rear. That one 90-degree photon that you're talking about is heading forward at a (not quite) 45 degree angle from vertical. (I say, "not quite" because at 45 degrees, the ship would be traveling at the speed of light, which isn't allowed.) The same is true of all the photons that were emitted at a 90 degree angle from the source in the ship's frame. In the ship's frame all these 90-degree photons trace out an expanding disk centered at the "point of emission" and ending as a great circle on the surface of the sphere. But the stationary observer will see those same photons tracing out a CONE opened to the right (assuming the ship is moving to the right) and ending as a slightly smaller circle on the surface of the sphere. The stationary frame still sees a sphere, but there are more photons packed toward the right side of the sphere than there are in the left side. To be clear the number of photons inside the cone I mentioned above is roughly equal to the number outside the cone, just as in the ship's frame the number of photons to the right of the disk is roughly the same as the number to the left of it.

And, since that sphere in the stationary frame stays centered at the point of emission, and the ship is moving, the photons in the rear of the sphere are BOUND to hit the rear wall of the ship before the forward heading photons will hit the front wall. This is exactly what the relativity of simultaneity asserts, as I've said several times now. "Trailing clocks run ahead." Simultaneous events in the ship's frame happen from aft to fore in the stationary frame.

Scott Reeves wrote:

"Well, the sphere isn't stationary in either frame, it's expanding at lightspeed; however I'm sure you didn't mean that. :-) "

Good point. I DO mean that it is expanding at light speed, but the center of the sphere (the point of emission) remains stationary and all the photons remain equidistant from the center at each instant, so that as a whole, the sphere isn't moving in space even as it's expanding at light speed. I mean it's like an expanding balloon that's stationary between two houses as opposed to an expanding balloon that's moving toward one house or the other.

“Both observers agree that the sphere is centered on that point in space time that you call "the point of emission". “

I sort of address this in my newest comment on the other video, but you haven’t had a chance to read this response or that one yet, as I haven’t posted either yet. So I’ll give the short version here and say that a more detailed bit is in my response on the other video.

Both observers do NOT agree that the sphere is centered on that point in space and time. They agree that the sphere is centered on A point in each of their reference frames, but they don’t agree that it’s the SAME point in both frames. They CAN’T agree on that if Relativity is a valid theory. Each observer sees a stationary point of emission in his own frame, and claims that the other observer’s point of emission is a “fake” point, as it is in motion relative to him, and a point in either observer’s coordinate space cannot be moving relative to that observer. The point of emission is basically the center of the light sphere, and if the light sphere moves, that means the point of emission must be moving, as the center of the sphere and the point of emission are identical.

“However, both observers do NOT agree that all the photons in that sphere are heading in the same direction.”

I get your point, UNLESS “same direction” means “away from the center of the sphere, or the point of emission.” The photons are ALWAYS heading away from the center of the sphere, regardless of the angle at which they’re heading away from it.

“And, since that sphere in the stationary frame stays centered at the point of emission, and the ship is moving, the photons in the rear of the sphere are BOUND to hit the rear wall of the ship before the forward heading photons will hit the front wall. This is exactly what the relativity of simultaneity asserts, as I've said several times now. "Trailing clocks run ahead." Simultaneous events in the ship's frame happen from aft to fore in the stationary frame.”

I don’t and have never disagreed with that, unless I’ve miscommunicated somewhere. I just disagree that Relativity is able to demonstrate that it represents physical reality. There’s an actual physical fact as to which of the two observers is correct about the timing of the strikes on the walls. That’s one of my main points: Relativity claims that events that are simultaneous in one frame are not necessarily simultaneous in another, but it’s physically impossible for that claim to be correct.